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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/711,185

08/31/2004

William E. Bernier

FIS920040056US1

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08/31/2006

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EXAMINER

IM, JUNGHWAM

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 08/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | | |
|------------------------------|------------------------|--|---------------------|--|
| Office Action Summary | Application No. | | Applicant(s) | |
| | 10/711,185 | | BERNIER ET AL. | |
| | Examiner | | Art Unit | |
| | Junghwa M. Im | | 2811 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 20-25 is/are allowed.
- 6) ☒ Claim(s) 8-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim Rejections - 35 USC § 103

Claims 8-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benenati et al. (US 6177729), hereinafter Benenati in view of Oh et al. (US 6959856), hereinafter Oh.

Regarding claim 8, Fig. 1 of Benenati shows a conductive interconnection [20] for joining an integrated circuit device [26] to a device carrier [28], said conductive interconnection comprising:

a polymer having a spherical shape (col. 3, lines 48-51) between said integrated circuit device and said device carrier.

Fig. 1 of Benenati shows most aspects of the instant invention except “metal projections extending towards said polymer from at least one of said integrated circuit device and said device carrier, wherein said metal projections each have a same height and extend partially into said polymer across the width of said polymer.” Fig. 4a of Oh shows a solder bump wherein metal projections [411] extending towards the bump [405] from at least one of said integrated circuit device [401] and said device carrier, wherein said metal projections each have a same height and extend partially into said bump across the width of said bump.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Oh in to the device of Benenati in order to have metal projections extending towards said polymer from at least one of said integrated circuit device and said device carrier, wherein said metal projections each have a same height and extend partially into said polymer across the width of said polymer to alleviate the cracking of the solder ball.

Regarding claims 9-10, Oh discloses that the shape of the projection can be varied (col. 4, lines 15-18).

Furthermore, it would have been obvious to have the recited shapes of the projection to accommodate the cracking propagation of the solder ball since such a modification would have involved a mere change in the shape of a component. A change in shape is generally recognized as being within the level of ordinary skill in the art. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Regarding claim 11, Oh discloses that the projection can be continuous, therefore the combined teachings of Benenati and Oh would show that said projections extend from both said integrated device and said device carrier.

Regarding claim 12, Benenati discloses that said polymer includes metal particles (col. 3, lines 60-63).

Regarding claims 13-14, Benenati discloses that said polymer comprises epoxy or ECA electrically conductive adhesive (col. 6, lines 15-18).

Claims 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benenati in view of Oh and Campbell et al. (US 6323432), hereinafter Campbell.

Regarding claims 15-16, Fig. 1 of Benenati shows a conductive interconnection for joining an integrated circuit device [28] to a device carrier [26], said conductive interconnection comprising

a polymer having a spherical (col. 3, lines 48-51) between said integrated circuit device said device carrier.

Fig. 1 of Benenati shows most aspects of the instant invention except dendrites within said polymer, wherein dendrites comprise a palladium-plated coating on a conductive material. Fig. 7a of Oh shows dendrites [711] within a solder bump

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Oh in to the device of Benenati in order to have to dendrites within said polymer to improve the connection of the solder balls.

The combined teachings of Benenati and Oh fail to show that dendrites comprise a plated coating on a conductive material. Champbell discloses that dendrites comprise a palladium plating on a conductive material (col. 2, line 66 – col. 3, line 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Campbell in to the device of Benenati and Oh in order to have to dendrites plated with palladium on a conductive material to improve the conductivity of the solder ball.

Regarding claim 17, Oh discloses that the shape of the projection is irregular (col. 4, lines 15-18).

Regarding claim 18, Benenati discloses that said polymer includes metal particles (col. 3, lines 60-63).

Regarding claims 19-20, Benenati discloses that said polymer comprises epoxy or ECA electrically conductive adhesive (col. 6, lines 15-18).

Allowable Subject Matter

Claims 21-25 are allowed.

Response to Arguments

Applicant's arguments with respect to pending claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

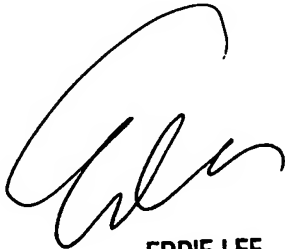
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jmi



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